

P. Carpenter

March 16, 1973

In practice linkages are only made when the perceived need is deemed worth the effort. Without a central system the "potential" barrier to forming linkages can involve costly software and hardware interfaces. In a clinical research and teaching environment the number of possibly useful combinatorial linkages is large. If the "potential" barrier is great, innovation and experimentation is impeded. The forces in the system are then centrifugal instead of centripetal.

Since the management of the clinics and hospital also depends more and more on computer manipulation and extraction of data, the total systems behavior will have important economic as well as academic consequences.

The proposal for Computer Health Care Application Research gives an insight into the clinical and academic benefits of a shared common data base. This and several other grant proposals, involving interdepartmental collaboration have called for linking of data bases. The second section of the proposal addresses the important problem of the definition of the data base. The third portion, deals with file and retrieval systems for a clinical data base. This involves the potential utilization by twelve specific clinical activities of a shared data base. This grant, if implemented would spend approximately \$86,000 per year in computer services. Some of these developments are currently underway on ACME.

In addition to the academic research needs of the clinical faculty, there are the requirements of the hospital for a shared data base. These are derived from managerial and economic imperatives as well as the hospital's educational and research goals.

There is no current completely acceptable solution that meets the requirements of a complete Hospital Information System (HIS). The search for this solution is a very important problem and one in which Stanford should be involved. It will affect many aspects of medical education and teaching as well as practice within a hospital environment. Within the next several years many elements of such systems will be successfully implemented and will be important parts of the operation of Stanford Hospital. The 370/158 has the capacity to allow Stanford to implement a hospital information system. The design of such a system and the timing and funding of its implementation are not part of this plan.

The Technicon HIS at El Camino provides insights into costs and CPU requirements of HIS. From the operation of the El Camino system since the first of this year, it now looks like they will in fact realize net savings of \$85,000 per month, most of which will be realized by reductions in nursing staff personnel. El Camino is a hospital with 446 beds and 60 bassinets. The Technicon Hospital Information System is designed around two 370/155's to support 2,000 beds at \$6.00 per day. The CPU cost is about one-third the total cost. This is in addition to the cost of business operating systems. Roughly, this says that implementation of such a system at Stanford with 612 beds and 57 bassinets would approximately double the dollars that would be available to be spent by the Hospital for central processing over our worst-case projections and a 50 per cent increase in our conservative projection in whatever year an HIS should be installed.

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It will be economically important in the future to bring together dispersed elements of a patient information system into a coherent whole. It may be too difficult and expensive to do so, if dispersion has gone on too long. This is the difference between a stand-alone community hospital and a hospital-cum-medical school. The former can wait until it knows exactly what it wants to do. Stanford Medical School faculty and their research and teaching interests are in integral part of Stanford Hospital. They will and should carry out their academic functions in the best way available to them. Nothing can or should stop the dispersive process except the better alternative of a well-managed reliable central system that by its very nature makes collaboration easy.

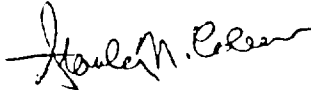
ECL/mla

Attach.

DATE: March 12, 1973

TO : Elliott Levinthal, Ph.D.

FROM : Stan Cohen, M. D.



SUBJECT: Need for Common Computer Facility at the Medical Center

As we have discussed previously, there is an important need for a computer facility at the medical center to provide capability for faculty to share programs and data related to both clinical activities and research projects. At the present time, individual projects being carried out by various faculty members constitute component parts of what will probably eventually develop into a hospital information system capable of handling large amounts of patient-related data. Included among these components are the drug interaction warning system of the Division of Clinical Pharmacology, the Microbiology laboratory system developed on ACME by Dr. Merigan and his collaborators, the Clinical Chemistry and Hematology laboratory system developed by Dr. Sussman, the Medical Records system of Dr. Jim Fries, and the Cardiology data system of Dr. D. Harrison.

Patient care at this medical center requires that these separate data bases be available on a central computer system so that information accumulated by one project can be shared by others. For example, the identity of organisms cultured by the Clinical Microbiology laboratory and their resistance pattern should be accessible by the pharmacy system programs, so that a prescription that is inappropriate for a particular organism or drug resistance pattern can be detected at the time it is filled. Similarly, data being accumulated by the clinical chemistry laboratory indicating inadequate renal function should be available to the pharmacy system, so that alteration of dosage may be made for a drug eliminated from the body by excretion through the kidneys. Conversely, drugs that artifactually influence the results of laboratory test findings by interference with spectrophotometric determinations and other test procedures, and this information should be available to the clinical laboratory. Cardiology data should be available for similar reasons, and since drug influence interpretation of cardiovascular tests, pharmacy data should be available through the cardiology system. All of the types of data indicated here, plus clinical findings related to the patient history and physical examination should be part of the time-oriented medical record system being developed by Dr. Fries.

Although this brief memo stresses the patient-care benefits that would derive from having a large medical center computer system available for sharing of data bases and programs, I also want to emphasize the importance of such a system to faculty research. Linkage of the clinical microbiology laboratory and pharmacy systems will enable epidemiological investigations of the effects of antibiotic use on resistance patterns of organisms isolated from patient populations. Similarly, research to detect new effects of drugs on clinical chemistry tests will also be feasible if the data bases can be shared. Although these are just a few examples, there are many other instances where sharing of data bases will enable important investigative questions to be asked and answered.

I hope that this brief memo provides the information you are seeking.

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DATE: March 8, 1973

To : Elliott Leventhal

FROM : James F. Fries

SUBJECT: Advantages of a variety of medical database operations sharing the same computing equipment.

Within the medical center and hospital there are a number of patient related computer databanks. Inevitably, the number and variety of clinical databank operations will increase over coming years. Material included in these databanks will be diverse yet similar. Thus, patient identifying information, financial and accounting information, clinical information required for insurance and third party carriers, historical and physical examination data elucidated by physicians, therapy prescribed and drugs dispensed, and the multiple forms of information emanating from various clinical laboratories, x-ray, cardiac catheterization and pathology departments will be accumulated in computer databanks. Over the long term, the facility with which information may be exchanged between these different operations will be of great importance. A research study may require stratification in terms of socio-economic data kept by the business office. The business office may require clinical information available in other databanks to process insurance forms. Billing may ultimately be related to the actual provision of the service at the physician level as documented in the chart and from laboratory information as it becomes available to the physician. Without provision for linkage and exchange of information the individual databank operations will require duplication of effort in data entry. Without capability of linking laboratory computer systems to clinical medical record databanks, laboratory data must be manually re-entered.

It can be stated fairly that medical computing has consisted in large part of duplication of effort both at Stanford and elsewhere. As the need for computer based clinical information systems grows there is the possibility of ever greater fragmentation and duplication of effort. The existence of a central computing facility for the medical center and hospital will allow planned growth, minimal redundancy, and exchange and pooling of clinical data. It will place the hospital and medical school in a strong position to meet increasing governmental requirements for "quality assurance" and medical audit.

JFF/hcp

St.

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March 8, 1973

Dr. Elliott Levinthal
Genetics Department

Dr. Donald C. Harrison
Cardiology Division

Advantages for a Hospital Computing System

Following our discussion yesterday, I have considered the advantages of a medical school computing system which would be a combination of hospital and medical school programs. The overall advantages are as follows:

- A. Having a joint facility in the medical center would permit a common data base for all patients. This is essential for ongoing clinical research and for ease in efficiency of administrative operations. The case for this is as follows:
 - 1. All patients under the care of Stanford faculty members in the Stanford University Hospital are either referred from the Stanford clinics prior to admission or are seen in follow-up in the clinics. Thus, it is essential that a data base include both aspects of the patient's record. This would encompass laboratory reports, x-ray studies, and ongoing follow-up data. These patients are frequently part of research protocols relating to the action of specific drugs, to the effects of surgical procedures, etc., and represent the basis for much of the clinical research being carried out by the clinical faculty.
 - 2. A patient seen by one particular group in the hospital is frequently seen by others and data common to studies being carried out by several interrelated groups should be available to the various division and departments. This is particularly true in the case of Cardiology where patients are first seen by the medical cardiologist. Data are accumulated on the patients by the clinical laboratories, by the x-ray units, by the cardiologic units with special computer facilities such as the catheterization laboratory or the EKG laboratory, and then the patients undergo some surgical procedure in the Surgery Department. These patients are then followed up jointly by the various members of the Medicine, Surgery, and Radiology faculty. Consultants from Infectious Disease, from Immunology, and from other disciplines also frequently are asked to see these patients. To develop new concepts regarding the pathogenesis of disease, to test this in clinical populations, and to determine the effects of interventions upon these diseases, it is essential that these groups interrelate their data.

Dr. Elliott Levinthal

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March 8, 1973

3. At the same time clinical data are being transmitted to patient's records, hospital charges can be assessed. Thus, for ease and efficiency of administrative detail, a cooperative computer facility is necessary.
- B. With increased emphasis upon judging the quality of medical care and upon determining cost effectiveness of care, the integration of hospital activities and medical school activities becomes absolutely essential. Computer surveillance for drug interactions, for physician performance, and for developing new educational activities related to this aspect of medicine, necessitate a combined hospital medical school computer facility.
- C. The accumulation of a critical mass of individuals working in hospital information systems for Stanford Medical School seems essential. The interrelationships of data from small computer systems in the various divisions and departments and support for these interfaces would be provided by a combined computer facility.

For the reasons of improving the delivery of health care, for enhancing clinical research, and for improving integrated teaching programs I would strongly support the development of a hospital medical school computer facility.

DCH:gr

DATE: March 9, 1973

MAR 12 1973

TO : Elliott Leventhal, M.D.
Associate Dean

FROM : Thomas C. Merigan, M.D.
Chief, Division of Infectious Diseases

SUBJECT:

This memo is in response to your questions in regard to my thoughts concerning the ACME system and its present and future contributions to clinical investigation. The availability of equipment and the ease of the language of ACME has personally benefited me enormously during the past 5 years while we have been working with patient oriented systems for our Diagnostic Microbiology and hospital epidemiology functions. As you know, all of our antimicrobial identification and antibiotic sensitivity data goes into ACME on an on-line basis from our hospital service laboratory. This involves only a minimal amount of time for our secretaries and technicians and produces a useful return from two stand-points: the antimicrobial sensitivity data is quality controlled prior to its issuance to physicians and all of our previous experience is immediately accessible for our clinical consultants as well as the Diagnostic Microbiology Laboratory personnel.

In regard to hospital epidemiology, the filed information is automatically put together on a monthly and semi-annual basis for reporting to the Infection Control Board members and the state and county authorities. The infection control nurses use this information in deciding whether there is any increased incidence of nosocomial infection at Stanford University Hospital, and now records dating back two years are available in that area whereas the antibiotic sensitivity and isolation information goes back some four years allowing many types of comparisons which wouldn't be possible without this regular recording of data.

I think the point you are particularly interested in, however, is how a commonly shared system among various clinical users which is tied in with the hospital system might be particularly advantageous. We find that as the ACME system was used for development and now the maintenance of our infection control and diagnostic microbiology systems, these two systems can be linked up quite easily and personnel who operate one can also utilize the other. However, a very exciting proposition has come up in that our systems are being linked to Dr. Stanley Cohen's pharmacy based system on drug interaction because our languages are compatible. His system was also initially developed on ACME equipment. Of course, he uses the hospital Business Office information in his pharmacy based system. We would use a shared data base with him as well as provide on-line quality control for the use of antibiotics. Hence, when drugs are ordered from the pharmacy prior to their issuance to the wards, the reports currently coming out of our Diagnostic Microbiology Laboratory would be used together with appropriate rules to advise all concerned as to their suitability.

It is quite likely that Dr. Howard Sussman's clinical chemistry information system will also be linked in the future to these systems to provide data on

potential limitations to use of antimicrobials which are an important part of the quality control of physician decision making. As you can see, having all three of these systems linked up to a common hospital base facility obviously allows interactive programs and shared data bases which would not be possible without much interfacing difficulties. Therefore, I believe a common hospital system will promote similar collaboration for others in the future.

Can you send me a copy of the application on Computer Health Care Applications Research for my files? Thank you.

APPENDIX B

STANFORD UNIVERSITY HOSPITAL
DATA PROCESSING DEPARTMENT

March 7, 1973

TO: Peter F. Carpenter, Assistant Vice President of Medical Affairs
FROM: V. H. Barber, Assistant Controller for EDP *VB*
SUBJECT: Medical Center Computer Planning Chronology

Presented below is a chronology of events related to computer planning from late 1970 to date.

Late 1970 - Early 1971

Medical Center Sub-Committee for Computing accomplished very little except for a survey of computer and data processing needs at the Stanford University Medical Center.

October 1971

President's Computer Science Advisory Committee annual visit results in general observation that computer planning has deteriorated.

December 8, 1971

Medical Center computer briefing to Dean Clayton Rich. Presentations by:

V. Barber
C. Dickens
G. Franklin
R. Jamtgaard
T. Phillips
M. Roberts

December 28, 1971

Medical Center Computer Planning Committee created.

Chairman: E. Levinthal
Members: S. Cohen, M.D.
J. DeGrazia, M.D.
E. Dong, M.D.
S. Kalman, M.D.
R. Jamtgaard
T. Rindfleisch
J. Stead
J. Williams
V. Barber

P. F. Carpenter

March 7, 1973

Medical Center Computer Planning Committee meetings were held on:

1/24/72 Various configurations of computers, utilization of HDP and ACME
1/31/72 loads were monitored. Organizational structures were studied;
2/15/72 long- and short-term plans were considered. Needs of research
3/6/72 groups were put forth. First major report of hardware alterna-
3/20/72 tives was presented March 20, 1972.

4/10/72

4/24/72

5/3/72

5/19/72

5/31/72

Various meetings in June

July 18 - August 3, 1972

Presentations of the various alternatives to computing in the Medical Center were made to the Computer Planning Committee.

July 18 Position paper advocating PDP-10 for the Stanford Medical Center Service Computing Facility - R. Jamtgaard and T. Rindfleisch.

July 26 Stanford University Medical Center Proposed Service Facility position paper - V. Barber.

August 3 Position paper advocating that computing service for the Stanford University Medical Center be supplied by a University computing facility - G. Franklin, T. Phillips, M. Roberts.

August 11, 12, 1972

Recap of Committee activity and alternatives for computing to Dean Rich. Made recommendation to him for computing. The conclusions of the Committee are attached in letters from E. Levinthal dated August 17 and August 18, 1972.

August 22, 1972

Medical School Executive Committee meeting. Clayton Rich, M.D., updated Executive Committee on computing alternatives (see attached letter of August 22, 1972).

August 21-23, 1972

Clayton Rich dismissed original committee (see 12/28/71) and created an interim committee:

Chairman: J. Stead

Members: V. Barber

R. Jamtgaard

E. Levinthal

P. F. Carpenter

March 7, 1973

Purpose: Summarize the financial and technical findings of the Medical Center Computer Planning Committee.

August 30, 1972

Interim Committee made its summarizing report to Clayton Rich (Copy attached: Letter of August 30, 1972).

September, 1972

Gene Franklin made recommendation to Vice Presidential Group regarding University-wide solution to computing. He was directed to draft a policy statement and a plan.

November 8, 1972

An Advisory Group on Computing Merger was established consisting of:

Chairman: G. Franklin
Members: K. Creighton
C. Dickens
T. Gonda, M.D.
E. Levinthal

This group appointed a Planning Task Force made up of:

Chairman: C. Dickens
Members: V. Barber
R. Jamtgaard
M. Ray
F. Riddle

November - December 1972

Task Force has several sub-committees. Various meetings were held during this period of time.

December 29, 1972

Task Force submitted its report and recommendation to the Advisory Group. Recommendations are attached.

January 1973

Dean Clayton Rich asked if the original SUH Data Processing proposal (see July 26, 1972) could offer a possible solution to Medical Center computing.

P. F. Carpenter

March 7, 1973

January - February 1973

Numerous meetings and analyses were conducted in this period. Results were a 360/65 or 370/158 if properly organized and planned could solve Medical Center computing needs.

February 23, 1973

Recommendation to Vice Presidential Group for purchase of a 370/158.

March 1973

Medical Center computing solution still under study.

vhb:adg

APPENDIX C

(Excerpt from ACME Note HAD)

IBM 2701/SATELLITE COMPUTER MULTIPLEXOR DESIGN AND OPERATION

I. INTRODUCTION

This paper is intended to describe the design criteria, specifications and feature, theory of operation, and operational procedures for the IBM 2701/SATELLITE COMPUTER MULTIPLEXOR. The design criteria section explains some design philosophies and some desirable features that such a system should have. Features section gives a list of specifications and features. Theory of operation explains in detail how this system works. And finally operational procedures section gives detailed trouble shooting procedures for problem isolation and procedures to bring on a new user.

II. DESIGN CRITERIA

The purpose of a HOST/SATELLITE COMPUTER MULTIPLEXOR is to allow several remote satellite computers to communicate directly to a host computer and vice versa. The main function of the satellite computer multiplexor is to allow only one satellite computer to communicate to/from the host computer at a time. The satellite computer multiplexor should be capable of handling up to sixteen remote satellite computers. The satellite computer multiplexor should be designed such that it will be independent of the host computers' and satellite computer's designs and/or operational characteristics. All remote satellite computers, 100 feet away from the host computer, must transmit data serially to/from the host computer via the satellite computer multiplexor. The satellite computer multiplexor must be capable of timing out in the event of any malfunction or due to one particular satellite computer which has used up its allotted time in transmitting data to/from the host computer. And lastly, the host computer must be capable of interrupting any of the satellite computers via the satellite computer multiplexor.

In order to meet the above criteria, the satellite computer multiplexor can be thought of as made up of three basic sections: host computer interface, multiplexor control, and satellite computer I/O control, as shown in Figure 1.

The function performed by the host computer interface is handling all I/O signals to/from the host computer.

The functions performed by the multiplexor control are queueing satellite computer interrupt requests, establishing communication with the host computer, making sure that proper identification from the satellite computer is passed to the host computer, passing status to the host and to the satellite computer at all phases of the data transfer, detecting time-out conditions, monitoring and flagging any malfunction for trouble-shooting purposes, and allowing the host computer to interrupt any satellite computer.

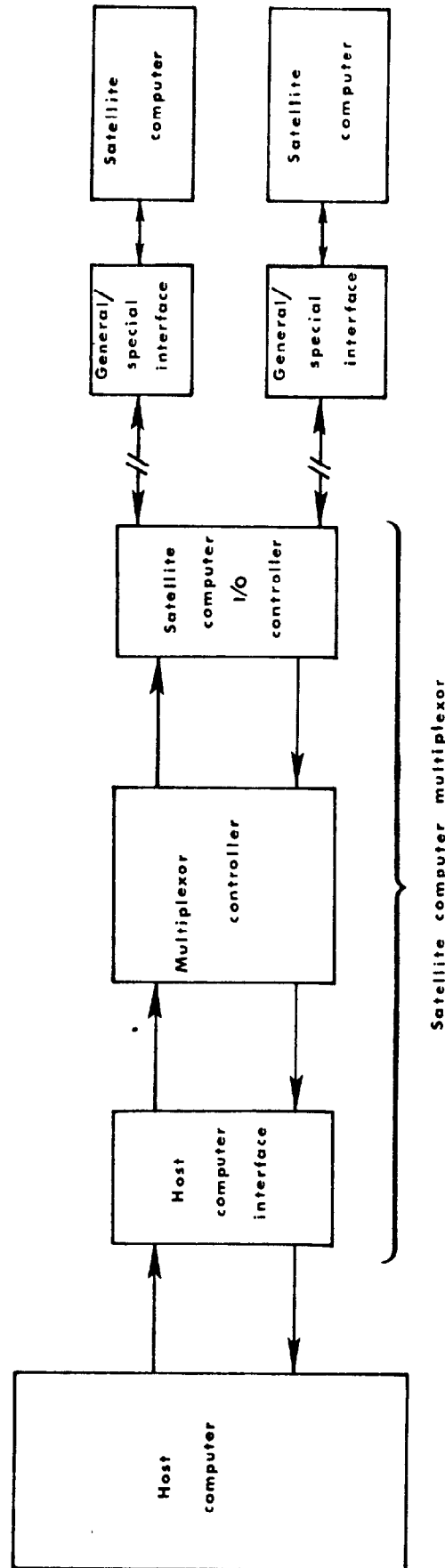


FIGURE 1 SATELLITE COMPUTER MULTIPLEXOR

The functions performed by the satellite computer I/O control are serializing and deserializing data to/from remote satellite computers and allowing parallel data transfer if satellite computers are within 100 feet of the host computer. Serial data are to be transmitted bit asynchronous and an optional choice between word or character asynchronous or synchronous.

In order to maintain complete flexibility at the satellite computer end because of different computers, the interface between the satellite computer multiplexor and the satellite computer is to be divided into general and special interfaces. The general interface is to handle all I/O signals to/from the satellite computer multiplexor and the special interface is to handle all I/O signals to/from a particular satellite computer.

For implementation, the host computer is an IBM 360/50 and the satellite computer multiplexor is interfaced to one of the ports of an IBM 2701 Parallel Data Adapter (PDA). This means that the satellite computer multiplexor will work with any IBM 360/370 host computer as long as it is interfaced through an IBM 2701 PDA port. Remote satellite computers, on the other hand, can be DEC PDP-8, 9, 10, 11, 12, 15 or XDS Sigma 3, 5, 7, or Hewlett/Packard HP-2411, 2115, 2116, or VARIAN 620i, 620f, or etc.

III. SPECIFICATIONS AND FEATURES

1. Handle up to 16 simultaneous satellite computers.
2. The satellite computer multiplexor is interrupt driven. It operates strictly on demand/response basis.
3. Each satellite computer talks to the IBM 360 on a first come, first served basis.
4. Each satellite computer can be assigned to any one of the 16 multiplexor channels.
5. Each satellite computer has a hardware key address at the satellite computer multiplexor end for ID purposes.
6. Transmission mode is by serial asynchronous half duplex for remote and/or parallel asynchronous for local operation.
7. Transmission speed is hardwired and the available speeds are: 250K*, 100K*, 50K, 10K, 5K baud per second.
8. Word transmission rate for maximum word length (20 bits) is: 12.5K, 5K, 2.5K, 500, 250 words per second.

*Recommended for twisted pair less than 1000 feet or coaxial cable for longer distances

9. Maximum serial bit transmission between satellite computer multiplexor and satellite computer is 20 bits; that is 1 start bit, 2 control bits, 16 data bits, and 1 stop bit.
10. Maximum word length from satellite computer is 16 bits.
11. Data path between IBM 2701 and satellite computer multiplexor is 16 bits wide.
12. The satellite computer has the option to run in complete demand/response (synchronous by character) or semi-complete demand/response (asynchronous by character) modes. Note this is not a programmable function.
13. The satellite computer running under complete demand/response mode requires four twisted pairs and operates at lower data rate.
14. The satellite computer running under semi-complete demand/response mode requires only two twisted pairs and operates at higher data rate.
15. The IBM 360 asynchronously can interrupt any satellite computer via the multiplexor.
16. The IBM 360 can pass status to a satellite during the normal transmission cycle.
17. The satellite computer will receive all error and termination conditions through coded messages from the multiplexor so that it can act accordingly.
18. Detailed handshaking procedures between the satellite computer and the host computer are described in the section "Asynchronous/Synchronous Data Transfer between Satellite and Host Computers".

ACME Note

ACME Notes Index

AA-40
Erica Baxter
May 11, 1973

ACME Notes, written by all members of the ACME staff, are informal working papers. They are divided below into four main categories: General Information, Administration and Utilization, System Information, and User Information. Subcategories under System Information and User Information parallel each other. Programs on ACME's PUBLIC file and the ACME Statistical Library are listed at the end of the Index.

The letters in the ACME Note codes are for filing and reference purposes only; the numbers in the codes--except for part of the J series--indicate reissues. All but historians can dispose of superseded issues. The J series and parts of other ACME Notes are incorporated into the PL/ACME Manual (AM) revisions.

If you wish to have a copy of an ACME Note, it is available at the ACME office. Those notes preceded by an asterisk (*) are new or have been changed in some way since the last ACME Notes Index was issued.

ACME Notes which have become OBSOLETE with this issue of AA are listed separately in the last section to this index.

GENERAL INFORMATION

AA-40 ACME Notes Index (Baxter)
MAY 11, 1973
AAOBS-8 Obsolete ACME Notes (Baxter)
OCT 10, 1972
ACONT-1 The Need and A Method to Obliterate Control Languages (Wiederhold)
Submitted to ACM SIGPLAN/SIGOPS Workshop, Savannah, Georgia, April 9-12,
1973
NOV 22, 1972
AD-1 An Advanced Computer System for Medical Research (History,
Goals, etc.) (Staff)
MAR 1967
ADJ-1 An Advanced Computer System for Medical Research (Wiederhold)
DEC 8, 1969
ADJJ-1 An Advanced Computer System for Medical Research (in Japanese)
(Wiederhold)
DEC 8, 1969
AE-3 A Timeshared Data-Acquisition System (Wiederhold/Hundley)
MAR 26, 1970
AF-1 A Filing System for Medical Research (Frey/Girardi/Wiederhold)
MAR 24, 1970
AFORT-1 Implementing a Time-Shared/Realtime System in FORTRAN (Frey)
APR 23, 1971
AG-1 Usage of the ACME System (Wiederhold)
To be published in Statistik an Dokumentation in der Medicine
NOV 15, 1971
AHCALL-1 Communication Hardware for Simplified Protocol (Stainton)
FEB 14, 1973
AI-1 The ACME Compiler (Breitbard/Wiederhold)
MAY 8, 1968
AIM-1 A Method for Increasing the Modularity of Large Systems (Wiederhold/Breitbard)
DEC 31, 1968
AINST-1 Instant 360--Chart (Wiederhold)
JAN 1, 1969
AL-1 An Advanced Computer System for Real-Time Medical Applications
(Wiederhold/Crouse)
DEC 4, 1968
AMS-1 Mass Spectrometers in a Time-Shared Environment
(Reynolds/Tucker/Stillman/Bridges)
OCT 10, 1969
AN-2 Setting Up a General-Purpose Data-Acquisition System (Wiederhold)
DEC 5, 1969
ANU-5 Information for New ACME Users (Baxter)
MAY 1, 1972
AO-3 Computers in the Medical Center (Staff)
SEP 13, 1972
APCALL-1 A Conventional Protocol for Synchronous Data Communications (Stainton)
FEB 14, 1973

APLAN-1 Preliminary Planning Outline for a 370/158 Facility (Jamtgaard)
NOV 6, 1972

APUB-11 Papers Written by ACME Users (Baxter)
JAN 10, 1973

AR-1 A Summary of the ACME System (Wiederhold)
Speech given at Argonne National Laboratory.
OCT 31, 1966

AS-2 A Summary of the ACME System (Wiederhold)
NOV 11, 1966

ASD-1 New Environments for Statistics (Wiederhold)
JUL 24, 1970

ASQ-1 Square Computers in Round Sieves - An Approach to Determining the
Suitability of Computing Alternatives - Minis, Maxis, Shared - For
Various Problems (Gio Wiederhold)
Position Paper for the Second Annual Communications Conference at
California State University at San Jose, Jan. 24-25, 1973
NOV 15, 1972

ATS-1 Instrumentation in a Time-shared Environment (Reynolds)
APR 1970

ATSC-1 Comparison of ACME and Three IBM Time-Sharing Systems (Frey)
JUL 12, 1972

ATYNET-1 Tymshare Network Feasibility (Stainton)
JAN 22, 1973

AV-4 Visitor's Information Sheet (Germano)
JAN 15, 1973

BASS-1 An Assessment of Current Developments in Computer Technology and Their
Significance for Development at the Stanford Medical Center (Wiederhold)
MAY 1, 1972

BDEN-1 Beyond Lisp (Wiederhold)
MAR 29, 1972

BDW-1 The Use of a General-Purpose Time-Shared Computer in Physiology
Research (Dong/Wiederhold)
Presented at National Heart and Lung Institute's Conf. on Resch. Animals,
WDC, Jan. 72.
JUN 30, 1972

BSD-1 Interactive Use of a Timesharing System for Medical Laboratory
Support (Crouse/Wiederhold)
JAN 4, 1970

BSPD-2 Sharing Patient Data Files (Wiederhold)
OCT 16, 1972

CONS-4 Consulting Schedule (Germano)
OCT 16, 1972

ES-3 Programs Available on Campus (Liere)
OCT 17, 1969

ESA-1 Statistical Programs and Subroutines Available at ACME (Whitner)
OCT 30, 1970

FY-1 The ACME File System (Miller)
FEB 27, 1969

HTAPE-2 Choice of Tape Units on 360/370 Equipment (IBM) (Wiederhold/Stainton)
Medical Center Computer Facility Planning Note
JAN 5, 1973

LT-3 List of Other Installations Doing Relevant Work (Wiederhold)
SEP 10, 1968

MOP-1 Comment on Medical Applications Oriented Preliminary Data Base
Programs (Weyl)
AUG 25, 1972

PLCH-1 A Choice of Language to Support Medical Research (Wiederhold)
Position paper for a panel discussion on "Computer Language for
Medicine," to be held at the 1972 ACM Conference, Boston
MAR 6, 1972

PMOD-1 Need for a Medical Applications Oriented Data Base Protocol and
Support Facility (Weyl)
JUL 6, 1972

FSCS-1 Proposal for Small Computer Service by ACME (Stainton)
MAR 21, 1972

PVM-3 Paging Rates for a Joint Stanford Computing Facility (Wiederhold)
Medical Center Computer Facility Planning Note
DEC 19, 1972

PVMT-1 Remarks on Paging Reference Distribution (Rindfleisch/Wiederhold)
JAN 15, 1973

SHARE-1 Trip Report - SHARE Interim Meeting, Dec. 3-6, 1972 (Frey)
Medical Center Computer Facility Planning Note
DEC 20, 1972

SUMFS-1 Specification of FORTRAN String Handling (G. Wiederhold)
Medical Center Computer Facility Planning Note
SEP 7, 1972

SUMINI-1 Minicomputer Support at SUMEX (Wiederhold)
Medical Center Computer Facility Planning Note
OCT 10, 1972

TCAM-1 Overview of the TCAM System (Stainton)
NOV 17, 1972

XDS-1 Test of ACME FORTRAN Code on XDS Compiler (Jamtgaard)
NOV 9, 1972

ADMINISTRATION AND UTILIZATION

AAB-3 ACME Note Index: Update and Listing - Administrative Aide Instructions (Bassett/Baxter)
JUL 17, 1972

AAC-3 ACME User Accounting - Administrative Aide Instructions -- Update & Listing (C. Miller/Baxter)
JUL 17, 1972

AACP-1 ACME Accounting Programs at Campus Facility (Baxter)
NOV 15, 1972

AAD-2 APUB -- Update & Listing (Baxter)
JUL 10, 1972

AAU71 Annual Dollar Usage At ACME (C. Miller)
SEP 13, 1971

AAU72 Annual Income by Category (Baxter)
AUG 4, 1972

ACM-1 Summary of Campus/ACME Merger Study (Jamtgaard)
NOV 30, 1971

ADISK-1 ACME Disk Write Times (Germano)
NOV 22, 1972

*AFE-13 IBM Field Engineering (F.E.), Data Processing (D.P.) and Office
Products (O.P.) Divisions (Lang)
APR 27, 1973

AORG-3 ACME Organization Chart (Baxter)
OCT 27, 1972

APAGE-1 ACME Service Rates (Jamtgaard)
one page
APR 16, 1972

APAGEX-1 Description of ACME Service Rates (Jamtgaard)
four pages
APR 13, 1972

ARATE-1 Revised Rate Structure for ACME Facility Services (Jamtgaard)
submitted to NIH, nine pages
APR 16, 1972

AU-31 Monthly Usage at ACME (Class/Baxter)
FEB 22, 1973

YPRANL-1 Distribution of Print Job Lengths (Germano)
NOV 10, 1972

SYSTEM INFORMATION

GENERAL

ADD-4 Useful Additions to the ACME Software (Wiederhold)
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